

Kohsaku YAMADA\*: A study of *Radula* from Mt. Kinabalu,  
North Borneo, collected by Drs. Z. Iwatsuki  
and M. Mizutani<sup>1)</sup>

山田耕作\*: 岩月・水谷両博士採集によるキナバル  
(ボルネオ) 産 *Radula* 属の研究

Dr. Z. Iwatsuki and Dr. M. Mizutani of the Hattori Botanical Laboratory made an extensive collection of Bryophytes in North Borneo, particularly on Mt. Kinabalu, in May and June of 1963. Recently, I took an opportunity to study the *Radula* from Mt. Kinabalu, North Borneo, at the Hattori Botanical Laboratory. I have not seen any reports of *Radula* species except those of Mizutani (1966) who recorded *Radula acuminata*, *R. nymanii*, and *R. tjibodensis* of sect. *Epiphyllae* from Mt. Kinabalu from their collection. In this study, I report 13 species of the genus including one newly described, in addition to Dr. Mizutani's 3 species.

I am very grateful to Dr. S. Hattori of the Hattori Botanical Laboratory and Dr. A. J. Sharp of the University of Tennessee for their critical and editorial advices, and also to Dr. M. Mizutani of the Hattori Botanical Laboratory, and Dr. N. Kitagawa of Nara University of Education for many valuable suggestions.

List of Species<sup>2),3)</sup>

- 1) *Radula acuminata* Steph., Sp. Hep. 4: 230 (1910).  
*Specim. exam.* Mt. Kinabalu, 1350-1900 m alt.: On living leaves, Z. 250216. M. 250219.

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- 1) This work was carried at the Hattori Botanical Laboratory, Nichinan, Miyazaki, from April to September, 1972.  
2) The collector's name under "Specimens examined" are abbreviated as follows: Z. Iwatsuki...Z. M. Mizutani...M. and only representative, single specimen is given.  
3) Duplicate material of most of the collections are also in the herbarium of the University of Tennessee, Knoxville.

- 2) *Radula anceps* Sande Lacoste, Nederl. Kruidk. Arch. 3: 419 (1850-54).  
*Specim. exam.* Mt. Kinabalu, 2000-2146 m alt.: On rock, M. 252461. New to Borneo.
- 3) *Radula apiculata* Sande Lacoste, Hedwigia 23: 150 (1884).  
*Specim. exam.* Mt. Kinabalu, 2000-2146 m alt.: On vertical surface of rocks, M. 252446. New to Borneo.
- 4) *Radula campanigera* Mont., Lond. Journ. Bot. 3: 634 (1844).  
*Specim. exam.* Mt. Kinabalu, 1400-2850 m alt.: On bush, Z. 251270a. M. 252177; On branch, M. 253591. New to Borneo.
- 5) *Radula cavifolia* Hampe, G. L. N., Syn. Hep. 259 (1844).  
*Specim. exam.* Mt. Kinabalu, 2984-3350 m alt.: On boulder, M. 252853. New to Borneo.  
Castle (1963) reduced *Radula cavifolia* to a synonym of *Radula aneurysmalis*. However, *R. cavifolia* is different from *R. aneurysmalis* in the longer lobule and strongly arched keel. I do not consider these two species to be conspecific.
- 6) *Radula densifolia* Castle, Rev. Bryol. Lichénol 32(3-4): 285 (1964-65).  
*Specim. exam.* Mt. Kinabalu, 1400-1900 m alt.: On fallen log, Z. 253428. New to Borneo.
- 7) *Radula formosa* (Meissner) Nees, G. L. N., Syn. Hep. 258 (1844).  
*Specim. exam.* Mt. Kinabalu, 1350-2800 m alt.: On tree trunk, M. 252333; On vertical surface of rock, M. 252744; On branches, Z. 250329. M. 252706; On shrubs, M. 252504; On fallen log, Z. 250310. New to Borneo.
- 8) *Radula gedena* Gott. ex Stephani, Hedwigia 23: 146 (1884).  
*Specim. exam.* Mt. Kinabalu, 1400-1900 m alt.: On branches of shrubs, Z. 250415. New to Borneo.
- 9) *Radula indica* Steph., Sp. Hep. 6: 511 (1924).  
*Specim. exam.* Mt. Kinabalu, 1350-1900 m alt.: On tree trunk and branches, M. 252155. New to Borneo.
- 10) *Radula javanica* Gott., G. L. N., Syn. Hep. 257 (1844).  
*Specim. exam.* Mt. Kinabalu, 1350-1400 m alt.: On branches of trees, Z. 251332a. M. 252082.
- 11) ***Radula mizutanii*** Yamada, nov. sp. (Fig. 1.)  
Planta flavo-brunnea; caulis 8-10 mm longus, irregulariter pinnatim ramosus, oblique patulus; folia caulina imbricata, convexa, ovata, apice:

late rotundato, lobulis subquadratis, apice valde elongato, obtuso arcte revoluto. *Radula indica*, spec. simillima, differt foliorum lobulis longioribus, apice arcte recurvato.

Plants yellow-brown in herbaria; stems 8-10 mm long,  $120\ \mu$  in diameter, with leaves 1.4 mm wide, irregularly pinnately branched; cross-section of the stem 5-6 cells thick, trigones large, cortical cells as large as medullary cells; rhizoids brown, on a pronounced swelling

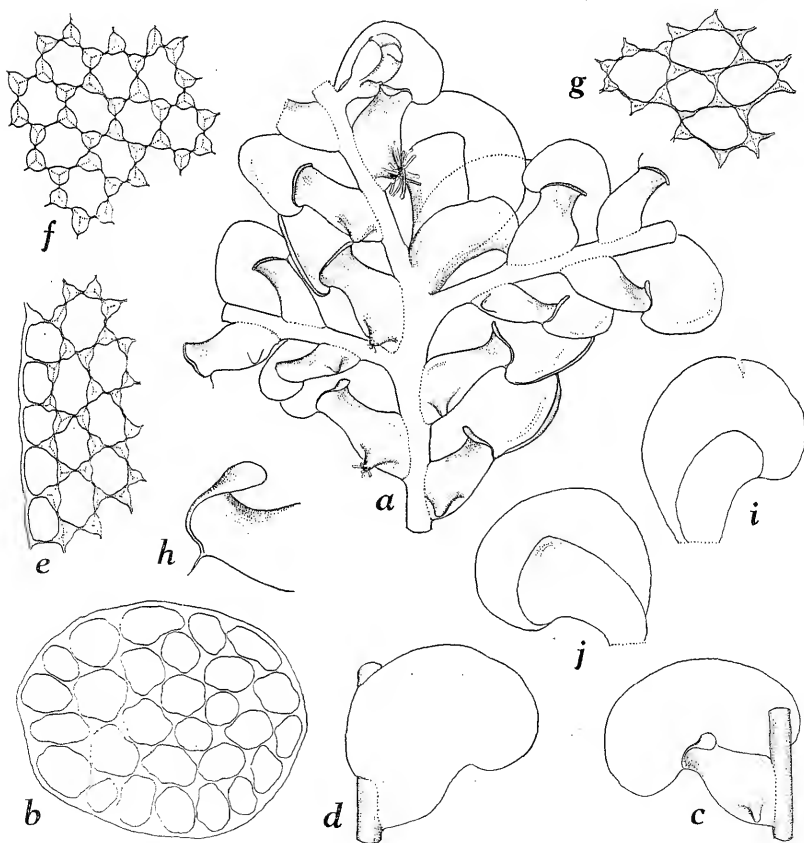


Fig. 1. *Radula mizutanii* Yamada. a. A part of plant with female bracts,  $\times 33$ . b. Cross-section of stem,  $\times 330$ . c. Leaf (ventral view),  $\times 33$ . d. Leaf (dorsal view),  $\times 33$ . e. Marginal cells of leaf,  $\times 330$ . f. Median cells of leaf,  $\times 330$ . g. Basal cells of leaf,  $\times 330$ . h. Apical portion of leaf-lobule,  $\times 82$ . i, j. Female bracts,  $\times 33$ . Figs. all drawn from no. 253654a.

near the base of lobule; leaves imbricate, obliquely spreading, the keel arched, at angles of about  $50-60^\circ$  with the stem; the leaf-lobe convex, ovate, about 0.7 mm long and 0.6 mm wide, margin entire, apex broadly rounded, base of dorsal margin, rounded, extending beyond for the edge of stem, line of insertion straight; marginal cells  $10-13 \times 10 \mu$ , median cells  $12-14 \times 10-16 \mu$ , basal cells  $23-26 \times 10-13 \mu$  cuticle verrucose, trigones large; leaf-lobule about  $3/4$  length of the lobe, keel 0.45-0.60 mm long, 0.22-0.25 mm wide, subquadrate, the apical portion strongly elongate with an obtuse apex, strongly revolute, insertion long and straight, lacking base of margin. Male inflorescence not seen. Female inflorescence terminal on the stem, with two subfloral innovations, female bracts strongly imbricate, the lobe of female bract oblong-ovate, as large as or slightly larger than stem leaf-lobe, about 0.7 mm long, 0.5-0.7 mm wide, the margin entire, the apex broadly rounded, the lobule of female bract about  $2/3$  length of the lobe, the apex subtruncate, about 0.5 mm long and 0.25 mm wide; perianth not seen.

*Specim. exam.* North Borneo; mossy forest near camp, Ulu Liwagu, SE slope of Mt. Kinabalu, 2450-2500 m alt., On tree trunk, 1-2 m from ground in shaded place, associated with *Lejeunea cucullata* and *Drepanolejeunea teysmanii*, Coll. M. Mizutani no. 3654a, type in NICH (253654a).

This species is very closely related to *Radula indica* Steph., but the latter is different from this new species in that (1) the leaf-lobule is much shorter, (2) the apical portion of leaf-lobule is never elongate and never revolute.

- 12) *Radula novae-guineae* Steph., Sp. Hep. 4: 233 (1910).

*Specim. exam.* Mt. Kinabalu, 2146-3200 m alt.: On branches, Z. 252589. M. 253712; On tree trunk, M. 252309b. New to Borneo.

- 13) *Radula nymanii* Steph., Sp. Hep. 6: 516 (1924).

*Specim. exam.* Mt. Kinabalu, 1350-1700 m alt.: On living leaves, Z. 251412. M. 250208a.

- 14) *Radula obscura* Mitt., Journ. Proc. Linn. Soc. Bot. 5: 107 (1861).

*Specim. exam.* Mt. Kinabalu, 2450-2500 m alt.: On bush, M. 253637. New to Borneo.

- 15) *Radula subpallens* Steph., Sp. Hep. 4: 203 (1910).  
*Specim. exam.* Mt. Kinabalu, 1350–1500 m alt.: On tree trunk, M. 253244.
- 16) *Radula tjibodensis* Goebel, Ann. Jard. Bot. Buitenzorg 7: 53 (1887).  
*Specim. exam.* Mt. Kinabalu, 1350–2500 m alt.: On living leaves, Z. 250514, M. 252490.

### References

Castle, H. 1963. A revision of the genus *Radula*. Part II. Subgenus *Acro-radula* section 6. *Saccatae* Revue Bryol. Lichénol. 32: 1–48. — Mizutani, M. 1966. Epiphyllous species of *Lejeuneaceae* from Sabah (North Borneo). Journ. Hattori Bot. Lab. 29: 153–170.

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1963年に、服部植物研究所の岩月善之助、水谷正美両博士がボルネオのキナバル山で採集された採集品の中から、とくに *Radula* 属だけを調べて 16 種の *Radula* を認め、同時に一新種の記載を行なった。16 種の内、10 種はボルネオ新産である。

□ Kremp, G. O. W. & T. Kawasaki: **The spores of the Pteridophytes.** B5 版, 398 ページ, 広川書店 (東京), 1972 年, 定価 13,000 円。本書は全部英語で書かれてどこにも日本語が見られないが、外箱に G. O. W. クレンプ・川崎次男共著: 世界の孢子図説—現生孢子・化石孢子—の題がついている。すなわちシダ植物の孢子だけの花粉学的な図鑑である。今まで植物分類学や花粉学の立場からシダの孢子を取り扱った論文や書物は多いけれども、本書ほどの大作は初めてである。内容は 2 部に分かれている。第 1 部は「現生シダ植物の孢子」で、288 属について写真と図のおおの 1~3 個ずつの全形図、それに細部の図がついている。またサンプル 10 例ほどについてそれぞれ形態や寸法の記載が加えてある。各属 1 種ずつを選んで書いてあるから 288 種になるわけであるが、ほとんどの属はその属の基準種を資料としているので、分類学的価値が非常に高い。これらのサンプルは全米の大学や博物館の標本から求めたということである。第 2 部は「化石シダ植物の孢子のおもな属の基準種」というもので、地質学や花粉学の古植物学の領域である。429 の孢子種について図 1 個ずつ、それに産地・地質時代その他の記載が整理され、並べ方は地質年代の順のようである。このように本書はシダ植物の孢子についてのデータを提供するもので、花粉学・地質学・石油探鉱学などの方面はもちろん、植物系統学などの方面にも大いに役に立つ書物である。(伊藤 洋)